

Amendments to the Claims

1. **(Currently Amended)** A multi-band, voltage-controlled oscillator comprising:
an oscillating transistor;
a resonant circuit coupled between a base and a collector of said oscillating transistor, said resonant circuit including having an inductor and a capacitor coupled in parallel with each other, wherein said inductor comprises a serial assembly having a first inductor and a second inductor coupled in series with each other, and said capacitor comprises a variable-capacitance diode;
a buffer transistor coupled to an output of said oscillating transistor;
a first output port coupled to an output of said buffer transistor;
~~a variable-capacitance diode forming said capacitor;~~
a control port adapted to supply from which a control voltage is applied to said variable-capacitance diode;
~~a serial assembly having a first inductor and a second inductor coupled in series with each other for forming said inductor;~~
a first switching device means made of a semiconductor for opening and short-circuiting operable to selectively open and short-circuit both ends of said second inductor;
a negative source generator coupled to the output of said buffer transistor;
a second switching device operable to means for selectively switch switching between an output of said negative source generator and a positive source;
a mode switching circuit adapted to receive receiving an output frequency switching signal from an outside said multi-band, voltage-controlled oscillator; and
a package including said oscillating transistor, said buffer transistor, said negative source generator circuit, and said mode switching circuit integrated therein,
wherein said second switching device means issues an output to control an opening and short-circuiting operation of said first switching device means to select an oscillation output at a first output frequency and an oscillation output of a second output frequency released from said first output port, the second output frequency being different from the first output frequency.

2. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 1, wherein ~~an oscillator including~~ said oscillation transistor and said resonant circuit form is of an unbalanced type oscillator.

3. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 1, wherein ~~an oscillator including~~ said oscillation transistor and said resonant circuit form is of a balanced type oscillator.

4. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 1, wherein said first switching device means includes a diode.

5. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 1, wherein said first switching device means includes a transistor.

6. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 1, wherein said package further includes a source port adapted to receive the from which a positive source and supply the positive source is supplied to said second switching device means is supplied.

7. **(Currently Amended)** A multi-band, voltage-controlled oscillator comprising:
an oscillating transistor;
a resonant circuit coupled between a base and a collector of said oscillating transistor, said resonant circuit including having an inductor and a capacitor connected in parallel with each other, said inductor comprising a serial assembly having a first inductor and a second inductor coupled in series with each other, and said capacitor comprising a variable-capacitance diode;
a buffer transistor coupled to an output of said oscillating transistor;
a first output port coupled to an output of said buffer transistor;
~~a variable-capacitance diode forming said capacitor~~
a control port adapted to supply from which a control voltage is applied to said variable-capacitance diode;

a serial assembly having a first inductor and second inductor coupled in series with each other for forming said inductor;

a first switching device means made of semiconductors for opening and short-circuiting operable to selectively open and short-circuit both ends of said second inductor;

a negative source generator coupled to an output of said buffer transistor;

a second switching device operable to means for selectively switch switching between an output of said negative source generator and a positive source, and release for releasing an output to control an opening and short-circuiting operation of said first switching device means to select between an oscillation output at a first output frequency and an oscillation output at a second output frequency released from said first output port, the second output frequency being higher than the first output frequency;

a mode switching circuit adapted to receive receiving an output frequency switching signal received from an outside of said multi-band, voltage-controlled oscillator;

a package including said oscillating transistor, said buffer transistor, said negative source generator, and said mode switching circuit integrated therein;

a third inductor and a fourth inductor coupled in series with each other and between a collector of said buffer transistor and a source, each of said third and fourth inductors being formed with a pattern;

a third switching device operable to selectively open and short-circuit means for opening and short-circuiting both ends of said fourth inductor according to an output of said second switching device means,

wherein said third inductor has an a length of substantially 1/4 wavelength of the second output frequency, and a composite pattern of said third and fourth inductors has a length of substantially 1/4 wavelength of the first output frequency.

8. (Currently Amended) A multi-band, voltage-controlled oscillator comprising:

a first oscillating transistor;

a resonant circuit coupled between a base and a collector of said first oscillating transistor, said resonant circuit having a first inductor and a first capacitor coupled in parallel with each other,

said first inductor comprising a serial assembly having a second inductor and third inductor coupled in series with each other, and said first capacitor comprising a first variable-capacitance diode;

a first buffer transistor coupled to an output of said first oscillating transistor;

a first variable-capacitance diode forming said first capacitor;

a serial assembly having a second inductor and third inductor coupled in series with each other for forming said first inductor;

a first switching device means made of semiconductors for opening and short-circuiting operable to selectively open and short-circuit both ends of said second inductor;

a negative source generator coupled to an output of said first buffer transistor;

a second switching device operable to means for selectively switch switching between an output of said negative source generator and a positive source, and release for releasing an output to control an opening and short-circuiting operation of said first switching device means to select between an oscillation output at a first output frequency and an oscillation output at a second output frequency released from said first buffer transistor, the second output frequency being higher than the first output frequency;

a mode switching circuit adapted to receive receiving an output frequency switching signal from an outside of said multi-band, voltage-controlled oscillator;

a second oscillation transistor;

a parallel assembly coupled between a base and a collector of said second oscillating transistor, said parallel assembly having a fourth inductor and a second capacitor coupled in parallel with each other, said second capacitor comprising a second variable-capacitance diode;

a second buffer transistor coupled to an output of said second oscillation transistor;

a second variable-capacitance diode forming said second capacitor

a control port through adapted to supply which a control voltage is applied to said first and second variable-capacitance diodes; and

a package including said first and second oscillating transistors, said first and second buffer transistors, said negative source generator, and said mode switching circuit integrated therein,

wherein said mode switching circuit, according to the output frequency switching signal from the outside of said multi-band, voltage controlled oscillator, selects between an output from said first buffer transistor and an output from said second buffer transistor.

9. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 8, wherein a ratio of the second frequency to the first frequency is not greater than 1.2, and wherein a ratio of a third frequency released from said second buffer transistor to the first frequency is not smaller than 1.5.

10. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 8,

wherein an oscillating operation of said second oscillating transistor is turned off when an output is released from said first buffer transistor, and

wherein an oscillating operation of said first oscillating transistor is turned off when an output is released from said second buffer transistor.

11. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 8, further comprising a logical adder circuit operable to calculate for calculating a logical addition of outputs of said first and second buffer transistors.

12. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 10, further comprising a PLL circuit coupled to an output of said logical adder circuit, said PLL circuit being integrated in said package.

13. **(Currently Amended)** A multi-band, voltage-controlled oscillator comprising:
an oscillating transistor;
a resonant circuit coupled between a base and a collector of said oscillating transistor, said resonant circuit having an inductor and a capacitor coupled in parallel with each other, said inductor

comprising a series assembly having a first inductor and a second inductor, and said capacitor comprising a variable-capacitance diode;

a buffer transistor coupled to an output of said oscillating transistor;

a first output port coupled to an output of said buffer transistor;

~~a variable-capacitance diode forming said capacitor;~~

a control port ~~from adapted to supply~~ which a control voltage is applied to said variable-capacitance diode;

~~a serial assembly forming said inductor, said series assembly having a first inductor and a second inductor;~~

a first switching device means made of a semiconductor for opening and short-circuiting operable to selectively open and short-circuit both ends of said second inductor;

a negative source generator coupled to an as output of said buffer transistor;

a second switching device operable to means for selectively switch switching between an output of said negative source generator and a positive source, and release for releasing an output to control an opening and short-circuiting operation of said first switching device means to select between an oscillation output at a first output frequency and an oscillation output at a second output frequency released from said first output port, the second output frequency being higher than the first output frequency;

a mode switching circuit adapted to receive receiving an output frequency switching signal from an outside of said multi-band, voltage-controlled oscillator;

a package including said oscillating transistor, said buffer transistor, said negative source generator, and said mode switching circuit integrated therein;

a first capacitor coupled ~~in series or parallel~~ with said variable-capacitance diode; and

a third switching device means coupled between both ends of said first capacitor,

wherein said third switching device is operable to substantially equalize ~~means makes~~ frequency sensitivities at the first and second output frequencies ~~substantially equal to each other~~ by an opening and short-circuiting operation thereof.

14. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 13, further comprising a second capacitor, wherein coupled in series with an assembly having said variable-capacitance diode and first capacitor is coupled in series with said second capacitor.

15. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 13, further comprising a second capacitor, wherein inductor coupled between two portions into which said first inductor is divided into two portions, said portions each having a substantially an equal inductance, and said second capacitor is coupled between said portions.

16. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 13, further comprising a second third capacitor coupled in parallel with said variable-capacitance diode.

17. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 13, wherein said first and second inductors are formed with patterns.

18. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 17, wherein after trimming said first inductor to adjust the second output frequency, said second inductor is trimmed to adjust the first output frequency.

19. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 18, further comprising:

a multi-layer substrate having including said first and second inductors formed therein; and
a grounding pattern formed at said multi-layer substrate, said grounding pattern not being not formed at a portion over which at least one of said first and second inductors is formed.

20. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 18, further comprising:

a multi-layer substrate having said first and second inductors including an inductor formed therein; and

a via-hole formed in said multi-layer substrate adapted to expose for exposing a portion of at least one of said first and second inductors to a surface of said multi-layer substrate,

wherein at least one of the first and second output frequencies can be adjusted by trimming said portion exposed to said surface of said multi-layer substrate.

21. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 13,

wherein said third switching device means includes a first switching diode coupled between both ends of said first capacitor,

wherein said first switching devices means includes a second switching diode coupled between both ends of said second inductor, and

wherein a voltage generated in said package is operable to generate a voltage is applied to said first and second switching diodes to control opening and short-circuiting operations of said third and first switching devices means, respectively.

22. **(Currently Amended)** A multi-band, voltage-controlled oscillator according to claim 13, wherein said first inductor is ~~formed with~~ a single inductor.

23. **(New)** A multi-band, voltage-controlled oscillator according to claim 1, wherein said first switching device comprises a semiconductor device.

24. **(New)** A multi-band, voltage-controlled oscillator according to claim 7, wherein said first switching device comprises semiconductor devices.

25. **(New)** A multi-band, voltage-controlled oscillator according to claim 8, wherein said first switching device comprises semiconductor devices.

26. (New) A multi-band, voltage-controlled oscillator according to claim 13, wherein said first switching device comprises a semiconductor device.

27. (New) A multi-band, voltage-controlled oscillator according to claim 13, wherein said first capacitor is coupled in parallel with said variable-capacitance diode.

28. (New) A multi-band, voltage-controlled oscillator according to claim 13, wherein said first capacitor is coupled in series with said variable-capacitance diode.